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PATENT
Confirmation No. 1544

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Board of Patent Appeals and Interferences

IN THE APPLICATION OF:

Frank P. Uckert et al. CASE NO.: **UC0210USNA**

APPLICATION NO.: **10/771,040** GROUP ART UNIT: **1774**

FILED: **February 03, 2004** EXAMINER: **Camie S. Thompson**

FOR: **Aromatic Polymers with Multiple Side Chains and Methods for Use Thereof**

APPEAL BRIEF UNDER 37 C.F.R. § 41.37

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Responsive to the Final Rejection mailed April 12, 2006 as to the above-referenced application, a Notice of Appeal having been filed on July 12, 2006, Appellant submits the following Appeal Brief.

1. Real Party in Interest

The application is assigned solely to E.I. du Pont de Nemours and Company, 1007 Market Street, Legal Patents, Wilmington, Delaware 19898, said assignment being recorded at reel 014681, frame 0673, on June 2, 2004.

2. Related Appeals and Interferences

Appellant is unaware of any related appeals or interferences.

3. Status of Claims

Claims 1-14 are pending. Claims 15-17 have been canceled. Claims 1-14 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Chen (U.S. Patent No. 5,998,045).

The final rejection of claims 1-14 is being appealed herein.

A copy of the pending claims is set forth in the Claims Appendix (Section 8 of this brief).

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4. Status of Amendments

The Amendment and Remarks paper of January 31, 2006 has been entered. The Response Under 37 C.F.R. § 1.116 has been considered.

5. Summary of Claimed Subject Matter

In an embodiment, the claimed subject matter encompasses a polymeric composition comprising aromatic monomeric units selected from fluorene, spirofluorene, and bridged biphenyl and a first and second substituent which are different from each other and are independently selected from alkyl, heteroalkyl, alkenyl, heteroalkenyl, alkynyl, heteroalkynyl, aryl, heteroaryl, arylalkyl, and heteroarylalkyl. In some embodiments the molar ratio of the monomeric units having the first substituent to monomeric units having the second substituent is in the range of from 1:100 to 1:10.

In further embodiments, the claimed subject matter includes polymeric compositions in which the first and second substituents are on the same monomeric unit or are on different monomeric units. In an embodiment, the first and second substituents are in the 9-position.

In some embodiments, the first and second substituents are independently selected from alkyl groups having 1-20 carbon atoms. In other embodiments, the C_1 to C_{20} alkyl moieties are selected from linear, cyclic, and branched chain, alkyl moieties. In further embodiments, these alkyl moieties are C_4 to C_{12} alkyl moieties.

The claimed subject matter is also directed to articles of manufacture including an OLED comprising an active layer and an electroluminescent device comprising an active layer, the active layers of both the OLED and the device comprising the polymeric composition of the main independent claim (claim 1).

Methods of the claimed subject matter are directed to improving the efficiency of an electroluminescent device by incorporating into the active layer of the device a polymeric composition of the main independent claim.

Additional method embodiments of the claimed subject matter are directed to the formation of a polymeric composition by providing a plurality of aromatic monomers selected from fluorene, spirofluorene, and bridged biphenyl and treating the monomers with at least two reagents for adding substituents as recited in claim 1 to the monomers and then polymerizing the mixture of randomly substituted monomers to form a polymer.

6. Grounds of Rejection to be Reviewed on Appeal

Whether claims 1-14 are anticipated under 35 U.S.C. § 102(b) by Chen et al., U.S. Patent No. 5,998,045 (hereinafter "Chen").

7. Argument

Whether claims 1-14 are anticipated under 35 U.S.C. § 102(b) by Chen.

Claimed Subject Matter Does Not Read on the Reference

Chen discloses an organic electroluminescent device comprising a light-emitting composition comprising poly(fluorene-*co*-anthracene) disposed between a first and second electrode (Abstract). Chen's light-emitting composition comprises the copolymer formed from fluorene and anthracene (Col. 2, lines 8-9). The fluorene monomer optionally may be substituted with one or more substituents including phenyl, benzyl, phenoxy, benzyloxy, or lower (C_1 to C_{10}) alkyl or alkoxy. There is a preference for disubstituting the fluorene at the 9-position (*e.g.*, 9,9-di-(C_4 to C_{10} alkyl)-fluorene or 9,9-diphenylfluorene. See Chen at Col. 2, lines 13-18). Chen also discloses (Col. 2, lines 24-49) that one or more additional comonomers may be used to enhance polymer properties such as hole or electron transport, spectral tuning, and mechanical and thermal properties. Suitable comonomers can be end-capping (monofunctional) or bifunctional. Comonomers suitable for such enhancements are listed by category of enhancement or desired property. Chen's copolymers of fluorene and anthracene suitably comprise about 5 to about 95 mole % of the fluorene monomer, preferably about 40 to about 65 mole %, and the rest anthracene. Copolymers with more than two monomers generally comprise about 40 to 80 mole % of the fluorene monomer, about 5 to 20 mole % of the anthracene, and the remainder of the additional monomer(s) (Col. 2, lines 50-60). The additional monomer(s) comprise the "third component" as that terminology is used in Chen's claims.

The present claims encompass homopolymers and copolymers in which the monomers are selected from fluorene, spirofluorene and bridged biphenyl. Chen does not diclose *any* homopolymer, nor does Chen disclosed *any* copolymer that does not comprise anthracene. As noted above, the light-emitting composition in Chen can be poly(fluorene-*co*-anthracene) or a copolymer containing one or more additional monomer(s), and therefore includes compositions such as poly(dihexylfluorene-*co*-anthracene-*co*-diphenylsulfone-*co*-triphenylamine) as in Chen's Example 3. Chen does not disclose spiorfluorene or bridged biphenyl monomers. Thus, in

addition to homopolymers, a copolymer of the present claims can be a polymer in which, for example, fluorene and bridged biphenyl monomeric units are combined, or, for example, fluorene monomeric units having different substituents are combined. Please see page 4, lines 5-8 of the application. A polymer may also comprise an *n*-mer of, for example, *n* fluorene units having the same or different substituents. Example 1 of the application discloses a fluorene trimer having three differently substituted fluorene units.

Some simple homopolymers and copolymers that fall within the scope of the present claims can be characterized as follows:

(i) Fluorene homopolymer;

(ii) Fluorene copolymer;

(iii) Spirofluorene homopolymer;

(iv) Spirofluorene copolymer;

(v) Bridged biphenyl homopolymer;

(vi) Bridged biphenyl copolymer;

(vii) Fluorene – bridged biphenyl copolymer;

(viii) Fluorene – spirofluorene copolymer;

(ix) Spirofluorene – bridged biphenyl copolymer.

Other combinations, including *n*-mers of differently substituted homomonomers, and also more complex copolymers, may easily be envisioned. None read on Chen. This is because, on the one hand, the compositions of Chen *must* be fluorene – anthracene copolymers and the claims do not recite anthracene monomers, and Chen does not disclose or suggest spirofluorene or bridged biphenyl monomers, on the other hand. Anthracene cannot result from a bridged biphenyl since biphenyl, by definition, has two phenyl rings, and anthracene, by definition, has three phenyl rings, fused in a consecutive linear arrangement. The biphenyls cited by the Examiner include diaryl sulfone, as exemplified by diphenylsulfone (R-S(=O)(=O)-R'), none of which are bridged biphenyls.

To summarize: none of the exemplary species or sub-genera listed above, or others that may readily be envisioned, read on Chen. Nor would more complex variants that one could envision for some or all of the above examples. Examples (i) through (vi), (viii) and (ix) and their more complex variants clearly do not read on Chen. Example (vii) equally clearly does not

because anthracene is a specific molecule, a fused triphenyl having a consecutive linear structure. Bridged biphenyl has a structure in which two phenyl rings have a single fused (spiro) carbon or a C-C linkage between two rings, and a bridge of substituent atoms linking the two phenyl rings at two other points, or two substituent chains linking the rings at two points, thus in either case forming a tricyclic structure having two phenyl rings and generally one alicyclic component. Appellant submits that there is no way such a tricyclic system can be configured to be anthracene and also constitute bridged biphenyl.

Prima Facie Anticipation Based on Prior Art Not Established

The applicable statute, as confirmed by precedent, places on the Office the burden of establishing a *prima facie* case of anticipation. *In re* King, 801 F.2d 1324, 1327, 231 USPQ 136, 138-39 (Fed. Cir. 1986); *In re* Wilder, 429 F.2d 447, 450, 166 USPQ 545, 548 (C.C.P.A. 1970). The Board has held that "[i]t is by now well settled that the burden of establishing a *prima facie* case of anticipation resides with the Patent and Trademark Office." *In re* Skinner, 2 USPQ2d 1788, 1788-89 (B.P.A.I. 1986). Appellant respectfully submits that in its most essential terms a *prima facie* case of anticipation requires the disclosure, in a single prior art reference, of each and every element of the claim under consideration (*W.L. Gore & Associates v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984)) arranged as in the claim (*Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 193 (Fed. Cir. 1983)). As stated by the Federal Circuit in *Scripps Clinic & Research Foundation v. Genentech Inc.*, 927 F.2d 1565, 18 USPQ2d 1001, 1010 (Fed. Cir. 1991), "There must be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention." In this case, the anticipation standard has not been met, because one or more claim elements are not disclosed or suggested by the reference and the arrangement of elements in the claims is different from that of the reference.

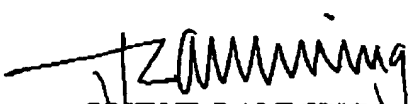
Chen does not disclose each element of the claimed subject matter. As presented above in the comparison of the Chen dislcosure and the claimed subject matter, Chen does not disclose spirofluorene or bridged biphenyl monomeric units. The lists of acceptable or suitable "third component" monomeric units in Chen as set forth in Col. 2, lines 24-49 include triarylamines, arylsulfones, and arylethers, with exemplary species listed; diarylamines; N-substituted

carbazoles and amino benzaldehyde hydrazones; aryl sulfones, aryl sulfoxides, fluorinated aryls, biphenyls, diaryl phosphine oxides, benzophenones, and electron-deficient heterocyclic compounds with exemplary species listed. None of these recite a spriofluorene or bridged biphenyl monmeric unit (biphenyl, as recited in Chen at Col. 2, line 45 is synonymous with diphenyl and is $C_6H_5C_6H_5$, such that the two rings are linked directly by a bond between a carbon atom of one ring and a carbon atom of the other ring, without an alkylene or other bridge to link the rings).

The elements in Chen are also arranged differently than in the claims. Chen requires a poly(fluorene-*co*-anthracene) that may include one or more of a number of "third component" monomeric unit(s) as discussed immediately above. As presented above, the elements of the claims are arranged such that the fluorene-*co*-anthracene block of Chen is not present. Read in this fashion, Chen cannot, in whatever combination "third component" monomers may be included in a copolymer, arrive at a homopolymer or copolymer that any of the pending claims would read on. Since Chen does not disclose each and every element of the claimed subject matter, and does not present those elements in the same arrangement as in the claims, Chen cannot anticipate the claims under review herein.

For all of the foregoing reasons, the Board of Patent Appeals and Interferences is respectfully requested to remand this application to the Examiner with a direction to allow the claims, or in the alternative to reopen prosecution so that claim amendments may be entered to place the claims in allowable form.

Respectfully submitted,



JOHN H. LAMMING
ATTORNEY FOR APPELLANT
Registration No.: 34,857
Telephone: (302) 992-5877
Facsimile: (302) 892-1026

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8. Claims Appendix

1. A polymeric composition comprising aromatic monomeric units selected from fluorene, spirofluorene, and bridged biphenyl, wherein the polymeric composition has at least a first substituent and a second substituent, wherein the first substituent is different from the second substituent and both substituents are independently selected from alkyl, heteroalkyl, alkenyl, heteroalkenyl, alkynyl, heteroalkynyl, aryl, heteroaryl, arylalkyl, and heteroarylalkyl.

2. The polymeric composition of Claim 1, wherein the first substituent and the second substituent are on the same monomeric unit.

3. The polymeric composition of Claim 1, wherein the first substituent and the second substituent are on different monomeric units.

4. The polymeric composition of Claim 1, wherein the first substituent and the second substituent are independently selected from alkyl groups having 1-20 carbons.

5. The polymeric composition of Claim 1, wherein the molar ratio of the monomeric units having the first alkyl substituent to monomeric units having the second alkyl substituent is in the range of 1:100 to 1:10.

6. The polymeric composition of Claim 8, wherein the molar ratio is in the range of 1:10 to 10:1.

7. The polymeric composition of Claim 1 wherein the aromatic monomeric unit is fluorene.

8. The polymeric composition of Claim 5 wherein the first substituent and second substituent are in the 9-position.

9. The polymeric composition of Claim 6, wherein the alkyl moieties are selected from C_1 to about C_{20} linear alkyl moieties, C_1 to about C_{20} cyclic alkyl moieties, and C_1 to about C_{20} branched chain alkyl moieties.

10. The polymeric composition of Claim 7, wherein the alkyl moieties are selected from C_4 to about C_{12} linear alkyl moieties, C_4 to about C_{12} cyclic alkyl moieties, and C_4 to about C_{12} branched chain alkyl moieties.

11. An organic light emitting diode (OLED) comprising an active layer comprising the polymeric composition of Claim 1.

12. An electroluminescent device comprising an active layer comprising the polymeric composition of Claim 1.

13. A method for improving the efficiency of an electroluminescent device, comprising incorporating into the active layer of the device a polymeric composition comprising aromatic monomeric units selected from fluorene, spirofluorene, and bridged biphenyl, wherein the polymeric composition has at least a first substituent and a second substituent, wherein the first substituent is different from the second substituent and both substituents are independently selected from alkyl, heteroalkyl, alkenyl, heteroalkenyl, alkynyl, heteroalkynyl, aryl, heteroaryl, arylalkyl, and heteroarylalkyl.

14. A method for forming a polymeric composition comprising

providing a plurality of aromatic monomers selected from fluorene, spirofluorene and bridged biphenyl;

treating the monomers with at least two reagents capable of adding substituents to the monomers, said substituents being independently selected from alkyl, heteroalkyl, alkenyl, heteroalkenyl, alkynyl, heteroalkynyl, aryl, heteroaryl, arylalkyl, and heteroarylalkyl, to form a mixture of randomly substituted monomers;

polymerizing said mixture of randomly substituted monomers to form a polymer.

9. Evidence Appendix

None.

10. Related Proceedings Appendix

None.